Listing of Claims

The below listing of claims will replace all prior versions of claims in the application.

1. (Currently Amended) A device for performing numerical value conversion, optimizing in speed and size, of an N-bit digital input value in a first unit being an arbitrary unit to a second unit being a natural unit, the second unit expressed in a natural unit of physical measurement and ~~the first unit~~ being related to the ~~second~~ first unit by a first equation, the N-bit digital input value being a digitized value of a first measurement parameter selected from among a plurality of measurement parameters, the device comprising:

a memory having stored thereon a look-up table storing a plurality of coefficients for performing the numerical value conversion from the first unit to the second unit for each of the plurality of measurement parameters, the look-up table being indexed using a first parameter to provide a selected coefficient pair of slope and offset coefficients, the first parameter being indicative of the first measurement parameter;

an arithmetic logic unit receiving the N-bit digital input value in the first unit and the selected coefficient pair of slope and offset coefficients from the look-up table, the arithmetic logic unit performing the numerical value conversion based on the first equation and using the N-bit digital input value and the selected coefficient pair to compute a digital output value in the second unit; and

a saturation-limit circuit coupled to receive the digital output value in the second unit from the arithmetic logic unit and provide a predetermined final output value when the digital output value exceeds a predetermined minimum or maximum value,

wherein the plurality of measurement parameters comprise temperature, voltage, bias current, and transmit power and receive power of an optical transceiver and the first parameter, being indicative of one of the measurement parameters, is selected to operate the device for supporting numerical value conversion of digital input values derived from multiple data sources; and

wherein the N-bit digital input value comprises a digital input value with variable bit-lengths, the variable bit-lengths comprising a first bit length and a second bit length different than the first bit length, the arithmetic logic unit generating a final

digital output value being expressed in Q bits, the Q bits of the final digital output value comprising the digital output value of the arithmetic logic unit having the first bit length and trailing zeros or the digital output value having the second bit length and trailing zeros.

2. (Original) The device of claim 1, wherein the saturation-limit circuit provides a first predetermined final output value when the digital output value exceeds a predetermined maximum value and provides a second predetermined final output value when the digital output value is below a predetermined minimum value.

3. (Original) The device of claim 2, wherein the digital output value comprises values between a maximum output value and a minimum output value, the first predetermined final output value being the maximum output value and the second predetermined final output value being the minimum output value.

4. (Original) The device of claim 3, wherein the second predetermined final output value is zero.

5. (Original) The device of claim 1, wherein the arithmetic logic unit comprises a fixed-function arithmetic logic unit capable of performing only multiplication and addition operations.

6. (Cancelled)

7. (Currently Amended) The device of claim 1 ~~claim 6~~, wherein the numerical value conversion from the arbitrary unit to the natural unit has a linear relationship described by the equation $D_N = m\ D_A + c$, where D_A is the digital input value, D_N is the digital output value, m is a slope coefficient and c is an offset coefficient, and the plurality of coefficients comprises a plurality of coefficient pairs for each of the plurality of measurement parameters, each coefficient pair comprising a slope coefficient and an offset coefficient.

8. (Currently Amended) The device of claim 1 ~~claim 6~~, wherein the numerical value conversion for the selected measurement parameter from the arbitrary unit to the natural unit has a non-linear relationship and the plurality of coefficients comprises a first set of coefficients for the selected measurement parameter, the first set of coefficients implementing

the numerical value conversion in a piecewise-linear fashion approximating the non-linear relationship.

9. (Original) The device of claim 8, wherein the first set of coefficients comprises coefficients for a plurality of linear segments for performing the piecewise-linear numerical value conversion, each linear segment being described by the equation $D_N = m\ D_A + c$, where D_A is the digital input value, D_N is the digital output value, m is a slope coefficient and c is an offset coefficient for the respective linear segment, and the first set of coefficients comprises a plurality of coefficient pairs, each coefficient pair comprising a slope coefficient and an offset coefficient for the respective linear segment.

Claims 10-11: (Cancelled)

12. (Currently Amended) A method for performing numerical value conversion, optimizing in speed and size, of an N-bit digital input value in a first unit being an arbitrary unit to a second unit being a natural unit, the second unit expressed in a natural unit of physical measurement and ~~the first unit~~ being related to the ~~second~~ first unit by a first equation, the N-bit digital input value being a digitized value of a first measurement parameter selected from among a plurality of measurement parameters, the method comprising:

storing a plurality of coefficients in a look-up table stored in a memory for performing the numerical value conversion from the first unit to the second unit, each of the plurality of measurement parameters being associated with at least one of the plurality of coefficients, the plurality of measurement parameters comprising temperature, voltage, bias current, and transmit power and receive power of an optical transceiver;

indexing the look-up table using a first parameter being indicative of the first measurement parameter to provide a selected coefficient pair of slope and offset coefficients, the first parameter being selected for supporting numerical value conversion of digital input values derived from multiple data sources;

providing the N-bit digital input value and the selected coefficient pair of slope and offset coefficients to an arithmetic logic unit;

performing a numerical value conversion at the arithmetic logic unit based on the first equation and using the N-bit digital input value and the selected coefficient to

compute a digital output value in the second unit from the digital input value in the first unit, wherein the N-bit digital input value comprises a digital input value with variable bit-lengths, the variable bit-lengths comprising a first bit length and a second bit length different than the first bit length, the arithmetic logic unit generating a final digital output value being expressed in Q bits, the Q bits of the final digital output value comprising the digital output value of the arithmetic logic unit having the first bit length and trailing zeros or the digital output value having the second bit length and trailing zeros;

determining if the digital output value exceeds a predetermined maximum value;

providing a first predetermined value as the final output value when the digital output value exceeds the predetermined maximum value; and

providing the digital output value as the final output value when the digital output value does not exceed the predetermined maximum value

13. (Original) The method of claim 12, further comprising:

determining if the digital output value is less than a predetermined minimum value;

providing a second predetermined value as the final output value when the digital output value is less than the predetermined minimum value; and

providing the digital output value as the final output value when the digital output value exceeds the predetermined minimum value.

14. (Original) The method of claim 12, wherein the digital output value comprises values between a maximum output value and a minimum output value, the first predetermined value being the maximum output value and the second predetermined value being the minimum output value.

15. (Original) The method of claim 12, wherein providing the digital input value and the selected coefficient to an arithmetic logic unit comprises:

providing the digital input value and the selected coefficient to a fixed-function arithmetic logic unit capable of performing only multiplication and addition operations.

16. (Cancelled)

17. (Previously presented) The method of claim 12, wherein storing a plurality of coefficients in a look-up table stored in a memory for performing the numerical value conversion from the first unit to the second unit comprises:

storing a plurality of coefficients in the look-up table wherein the numerical value conversion from the arbitrary unit to the natural unit has a linear relationship described by the equation $D_N = m\ D_A + c$, where D_A is the digital input value, D_N is the digital output value, m is a slope coefficient and c is an offset coefficient, and the plurality of coefficients comprises a plurality of coefficient pairs for each of the plurality of measurement parameters, each coefficient pair comprising a slope coefficient and an offset coefficient.

18. (Previously presented) The method of claim 12, wherein storing a plurality of coefficients in a look-up table stored in a memory for performing the numerical value conversion from the first unit to the second unit comprises:

storing a plurality of coefficients in the look-up table wherein the numerical value conversion from the arbitrary unit to the natural unit has a non-linear relationship and the plurality of coefficients comprises a first set of coefficients for the selected measurement parameter, the first set of coefficients implementing the numerical value conversion in a piecewise-linear fashion approximating the non-linear relationship.

19. (Original) The method of claim 18, wherein the first set of coefficients comprises coefficients for a plurality of linear segments for performing the piecewise-linear numerical value conversion, each linear segment being described by the equation $D_N = m\ D_A + c$, where D_A is the digital input value, D_N is the digital output value, m is a slope coefficient and c is an offset coefficient for the respective linear segment, and the first set of coefficients comprises a plurality of coefficient pairs, each coefficient pair comprising a slope coefficient and an offset coefficient for the respective linear segment.

20. (Cancelled)